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SPECIFICATION:

Title: Replace with the following new title--Electric Musical Instrument Transducer, [Electric Percussion Instruments]

Paragraph 1, replace with the following new paragraph:

This invention relates generally to the field of musical instruments, more particularly to an improved set of electric ~~percussion instruments~~ musical instrument transducers (sometimes referred to as pickups) better adapted to interface acoustic musical instruments with electronic recording and amplification equipment. There are ~~two~~ three different models for ~~percussion musical~~ instruments in common usage at the time of this writing: ~~acoustic and, electronic, and electric.~~ There is also a third model, electric percussion, which is less widely used. This invention relates to the ~~third~~ first category, and aims to help acoustic instruments have some of the advantages of the other instrument types. For completeness, all three categories will be discussed here. Note that the primary emphasis of the discussion will be on percussion instruments, although this invention can be used on other types of instruments as well, those that use some form of soundboard for sound propagation. These two categories of instruments have much in common; a percussion instrument can be understood as a soundboard stimulated

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by direct impact, and a banjo (a soundboard instrument) uses a membrane as its soundboard that is essentially a drumhead in terms of its construction and mounting. In discussing the three general types of instruments, we will examine percussion instruments first, then examine the similarities between the percussion and soundboard instruments.

Heading after paragraph 1, replace with the following--Acoustic percussion instruments,

Paragraphs 5, 6, and 7, replace the word "micing" where it occurs with its more conventional spelling "miking",

After paragraph 8, insert the following two new paragraphs:

Other acoustic musical instruments exist that propagate sound through a soundboard or its equivalent, which are referred to here as soundboard instruments. These instruments include a number of stringed instruments like banjos, acoustic guitars, violins, lutes, mandolins, pianos, harps, and many others. These instruments may have a part of the instrument known as a soundboard, as the piano does, but many of these instruments use other parts of the instrument instead as a soundboard equivalent, such as the hollow body of an acoustic guitar. In these instruments, vibrations are created in the soundboard or equivalent indirectly, generally by plucking, picking,

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hammering, or otherwise stimulating stretched strings attached to the soundboard or equivalent. The vibrating strings vibrate the soundboard or equivalent, which propagates the sound to the air more effectively than the vibrating strings do themselves. The banjo is particularly interesting in the context of this discussion because in terms of its construction, it is essentially a drum whose head, called a membrane, vibrates not by direct impact, but instead by the vibrations of stretched strings connected to the membrane through a bridge.

Soundboard instruments, like the acoustic percussion instruments discussed earlier, generally rely on microphones to interface with audio recording and amplification equipment. For this reason they suffer the same kinds of drawbacks that acoustic percussion instruments do. Piezoelectric devices known as contact pickups are sometimes used to sense vibrations over small areas of soundboards or their equivalents. The signal quality produced by contact pickups is generally poor, especially in terms of their low frequency response.

Heading before paragraph 9, replace with the following--Electronic ~~percussion~~ instruments,

After paragraph 12, insert the following new paragraph:

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Soundboard instruments have their electronic counterparts as well, such as the electronic keyboard and (more rarely) electronic guitar-like devices. Again, they have an interface similar to their acoustic counterparts, but their output waveforms are based on sampled or electronically synthesized sounds from an electronic module within the instrument. They are often rejected by musicians and listeners for the same reasons electronic percussion instruments are rejected, including their repetitive output waveforms and their poor playability compared to their acoustic counterparts.

Heading before paragraph 13, replace with the following--Electric ~~percussion~~ instruments,

After paragraph 15, insert the following new paragraph:

Regarding the soundboard instruments, the most famous and commonly used electric analogs are stringed instruments like electric guitars and basses. Other electric analogs of soundboard instruments exist, such as the electric violin, that use piezoelectric elements on variants of the instrument bridge to detect string vibrations. Note that in either case they do not capture the vibrations of a soundboard or its equivalent, which they often lack entirely. Consequently, electric stringed instruments do not sound like their acoustic counterparts, but instead have their own unique sounds. These electric instruments

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are used and valued for many reasons, but they are no substitute for their acoustic progenitors. Acoustic guitars and violins, for example, are still commonly found on concert stages and in recording studios for this reason.

Paragraph 16, replace with the following new paragraph:

It is an object of the invention to provide ~~electric~~ percussion and soundboard instruments a transducer that uses their sound emitting vibrating surfaces to generate ~~sound directly as well as~~ electrical waveforms for recording or amplification purposes, thus combining the advantages of acoustic, electric and electronic ~~percussion~~ instruments. ~~This waveform is~~ These waveforms are to be generated by ~~creating a voltage difference between a layer of the vibrating surface portion and a sensor portion placed in close proximity. This sensor is connected to a voltage source through a source of electrical impedance (such as a resistor). When the electric percussion instrument receives an activating action from a performer, such as a stick strike, the voltage difference between vibrating surface and sensor will oscillate in response, and that voltage oscillation~~ adding a transducer to these instruments that generates its signal using one or more air gapped parallel plate variable capacitors. These capacitors have one or more plates that comprise, cover, or are embedded within

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vibrating portions of the instrument that emit sound waves when the instrument is played (such as a drumhead, soundboard, or hollow instrument body). When the instrument is played, vibrations in the instrument continuously and directly (without using airborne sound as an intermediary) change the capacitance of the variable capacitors by bending one of their plates, creating time-varying voltage oscillations in the capacitors directly corresponding to the vibrational state of the vibrating surface, and thus corresponding to the sound of the instrument. These voltage oscillations can be sent through an electronic circuit to external recording or amplification equipment.

Paragraph 17 is to be stricken,

Paragraph 18 is to be replaced with the following new paragraph:

It is another object of the invention to provide an electric musical instrument transducer whose signal output is more independent of the amount of sound the instrument emits. For example, the volume level of a drum can depend on many factors, including the materials used in the construction of its heads and the presence of muting devices, such as tape or fabric, attached to its heads. This invention can be constructed to produce an equally strong signal on both relatively loud and relatively quiet instruments.

Paragraph 21 is to be replaced with the following new paragraph:

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FIG. 1 is a side view of ~~an electric drum~~ a double-headed drum with electric transducer, one embodiment of the invention,

Paragraph 26 is to be replaced with the following new paragraph,

FIG. 6 is a schematic view of an electric control module for an electric drum transducer.

Paragraph 27 is to be replaced with the following new paragraph,

FIG. 7 is a perspective view of ~~an electric~~ a cymbal with electric transducer, another embodiment of the invention,

Paragraph 29 is to be replaced with the following new paragraph,

FIG. 9 is a schematic view of an electric control module for an electric cymbal transducer.

Heading before paragraph 30 is to be replaced as follows,

Double-headed ~~electric drum~~ with electric transducer

Paragraph 30, the first sentence is to be replaced as follows,

Referring now to the drawings, FIG. 1 depicts an embodiment of the invention, a double-headed ~~electric drum~~ with electric transducer 1.

Paragraph 33, replace the term "electric drum" where it occurs with "drum".

Heading before paragraph 36 is to be replaced as follows,

~~Electric cymbal~~ Cymbal with electric transducer

Paragraph 36, the first sentence is to be replaced as follows,

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FIG. 7 depicts a perspective view of ~~an electric~~ a cymbal with electric
transducer.

Paragraphs 37 and 39, replace the term "electric cymbal" where it occurs
with "cymbal".